

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PRELIMINARY GEOLOGIC MAP OF THE CASPER 1° x 2° QUADRANGLE
CENTRAL WYOMING

Compiled by

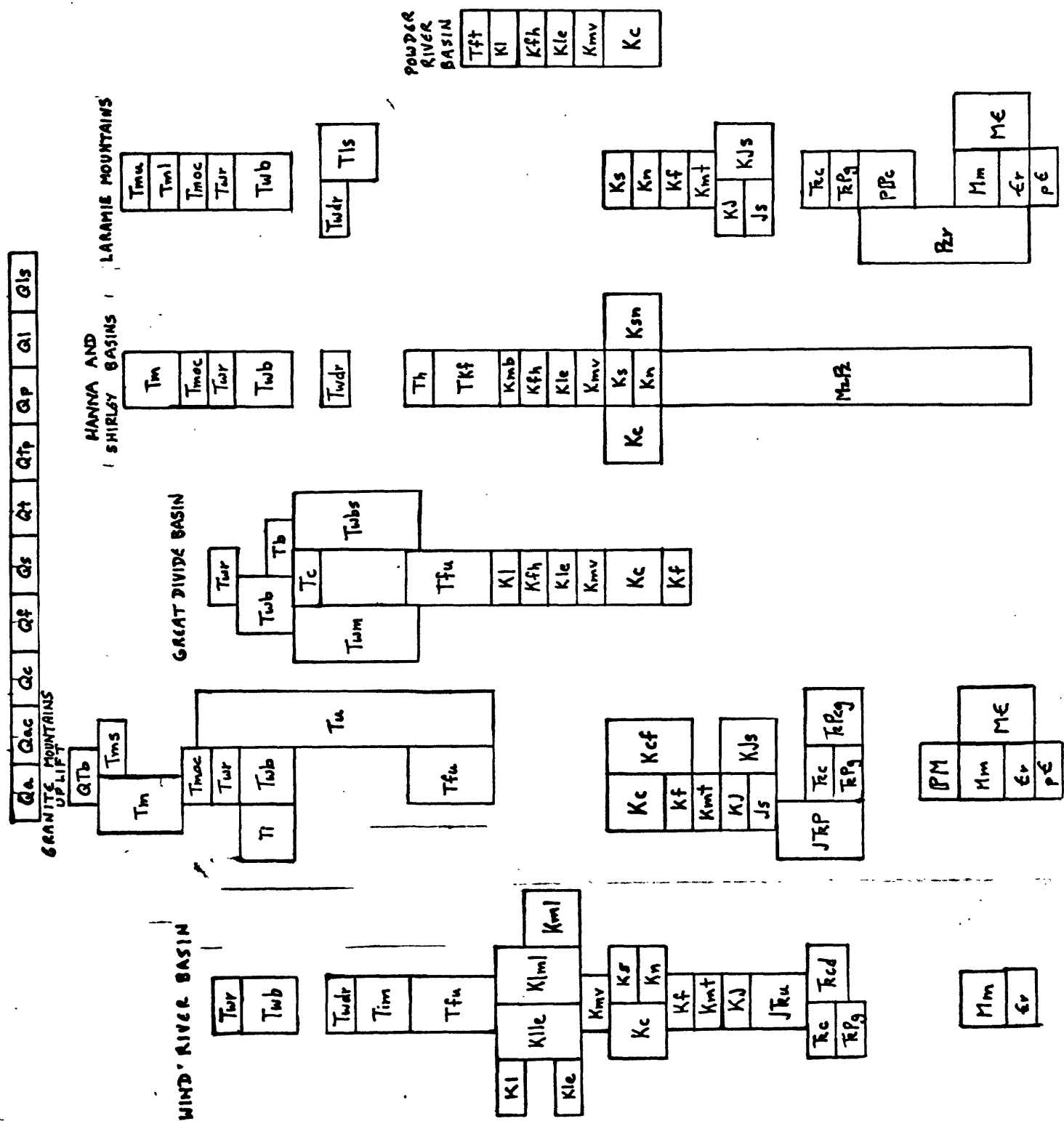
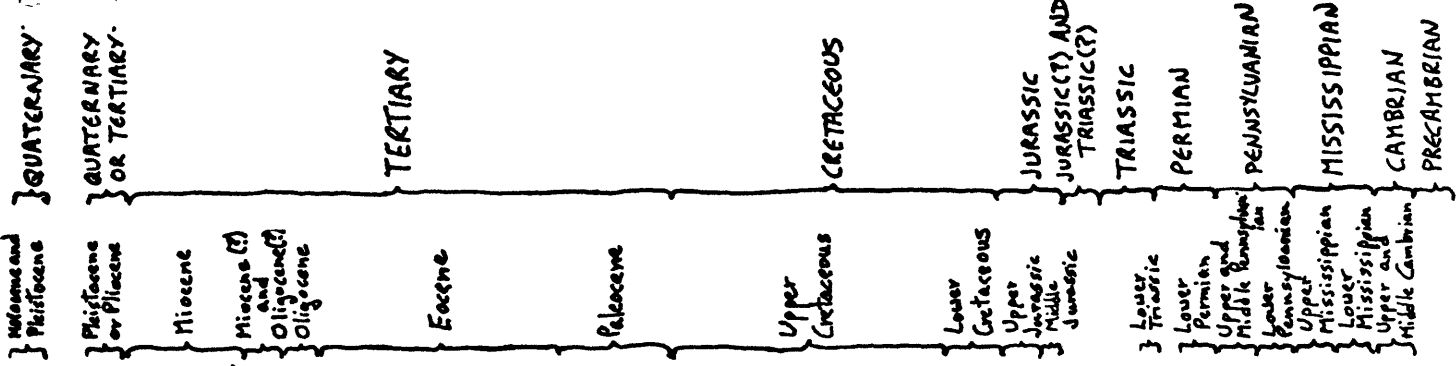
J. D. Love, Ann Coe Christiansen, J. L. Earle, and

Richard W. Jones

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This report is preliminary and has not
been edited or reviewed for conformity
with U.S. Geological Survey standards
and nomenclature.



DESCRIPTION OF MAP UNITS

[The Miocene-Pliocene boundary is used in the European sense, as applied to marine rocks (Berggren and Van Couvering, 1974), the separation being at about 5 m.y. (million years).]

- Qa ALLUVIAL DEPOSITS (HOLOCENE AND PLEISTOCENE)--Unconsolidated and poorly consolidated clay, silt, sand, and gravel, mainly in flood plains and lowest terraces
- Qac ALLUVIUM AND COLLUVIUM (HOLOCENE AND PLEISTOCENE)
- Qc COLLUVIUM (HOLOCENE AND PLEISTOCENE)--Heterogeneous deposits of rock detritus, unsized and unsorted
- Qf ALLUVIAL FAN DEPOSITS (HOLOCENE AND PLEISTOCENE)--Water-laid gravel, sand, silt, and clay spreading out from mouths of ravines and canyons
- Qs WINDBLOWN SAND (HOLOCENE AND PLEISTOCENE)--Chiefly gray quartz sand; includes active and dormant sand dunes
- Qt TERRACE GRAVEL (HOLOCENE AND PLEISTOCENE)--Unconsolidated to partly consolidated deposits of boulders, gravel, sand, and silt on surfaces at various elevations above modern streams
- Qtp TERRACE AND PEDIMENT GRAVEL (HOLOCENE AND PLEISTOCENE)
- Qp PEDIMENT GRAVEL (HOLOCENE AND PLEISTOCENE)--Angular to subrounded rock fragments in coarse sand matrix deposited on bedrock surfaces sloping away from upland source areas
- Q1 LACUSTRINE OR PLAYA DEPOSITS (HOLOCENE AND PLEISTOCENE)--Finely bedded deposits of sand, silt, and clay; in southwest corner of quadrangle
- Q1s LANDSLIDE DEPOSITS (HOLOCENE AND PLEISTOCENE)--Unsized and unsorted rock debris emplaced by mass movement
- Q1b BUG FORMATION (PLEISTOCENE OR PLIOCENE)--Pale-green, brown, and white claystone, tuff, radioactive limestone, and conglomerate which contains andesite and chalcedony pebbles. Thickness 0-38 m (0-125 ft)
- Tms MOONSTONE FORMATION (UPPER MIOCENE)--Light-gray, pale-green, and brown tuff and tuffaceous sandstone, radioactive white shale and algal limestone, and, in lower part, thick beds of arkose; abundant chalcedony layers and pebbles and small silicified algal heads. Thickness 0-410 m (0-1,350 ft)
- Tm MIOCENE ROCKS UNDIVIDED
- Tmu Upper part (upper Miocene)--Heterogeneous sequence of white soft tuffaceous sandstone with frosted rounded quartz grains and abundant magnetite, and limestone, pumicite beds, and lesser amounts of claystone and conglomerate. Includes Moonstone Formation in south-central part of the quadrangle. Thickness 0-500+ m (0-1,650+ ft)
- Tml Lower part (lower Miocene)--Chiefly white to light-gray tuffaceous sandstone, eolian in part, composed of frosted rounded quartz grains and abundant magnetite; sparse lenticular white limestones. Base intertongues with conglomerate (Tmoc) and may be partly Oligocene. Thickness 0-120+ m (0-400+ft)

- Tmoc** MIOCENE(?) AND OLIGOCENE(?) CONGLOMERATE--Gray, brown, and pink arkosic conglomerate interbedded with gray and pink blocky tuffaceous claystone in some areas and gray soft sandstone with frosted rounded quartz grains and abundant magnetite in others. Thickness 0-180 m (0-600 ft)
- Tu** PRE-MIOCENE TERTIARY ROCKS--Correlation uncertain
- Twr** WHITE RIVER FORMATION (OLIGOCENE)--White, pink, brown, and green tuffaceous claystone and siltstone; thin beds of pumicite and limestone; lenticular conglomerates near base. K-Ar ages of pumicite beds range from 35.2 m.y. in the lower part to 31.6 m.y. near the top (Evernden and others, 1964). Thickness 0-260 m (0-850 ft)
- Ti** INTRUSIVE ROCKS (UPPER AND MIDDLE EOCENE)--Several varieties of trachytes, quartz latite, phonolite, and rhyolite. The quartz latite has a K-Ar age of 44.0 ± 2.6 m.y. and the phonolite 43.6 ± 1.0 m.y. (Pekarek and others, 1974)
- Twb** WAGON BED FORMATION (UPPER AND MIDDLE EOCENE)
 Western part--Variegated mudstone, tuffaceous siliceous hard sandstone, tuff, rhyodacite breccia flows, and, near base, arkosic conglomerates and granite boulders. Thickness 0-150 m (0-500 ft)
 Eastern part--Pale-green to dully variegated tuffaceous siliceous claystone underlain by giant granite boulders in tuffaceous matrix. Thickness 0-50 m (0-160 ft)
- Tb** BRIDGER FORMATION (MIDDLE EOCENE)--Brown, gray, and pale-green hard siliceous claystone and arkosic sandstone, underlain by soft gray bentonitic claystone; lower part is hard siliceous claystone, snowy white pumicite, and arkose. Present only in southwestern corner of quadrangle. Thickness 0-70 m (0-220 ft)
- Tc** CROOKS GAP CONGLOMERATE (MIDDLE AND LOWER EOCENE)--Conglomerate of giant granite boulders in a coarse arkosic sandstone matrix. Overlaps unconformably across lower Eocene strata. Thickness 0-460 m (0-1,500 ft)
- Twbs** WASATCH AND BATTLE SPRING FORMATIONS (MIDDLE AND LOWER EOCENE AND PALEOCENE)--Granite conglomerate and coarse arkosic sandstone, grading southward into finer grained sandstone, siltstone, variegated to gray claystone, and coal beds in main body of Wasatch Formation. The Battle Spring Formation is a basin-margin facies of the Wasatch Formation and there is no consistent basis for separating them. Thickness 0-1,220 m (0-4,000 ft)
- Twm** MAIN BODY OF WASATCH FORMATION (MIDDLE AND LOWER EOCENE AND PALEOCENE)--Basinward fine-grained facies of Wasatch Formation; present in southwestern corner of quadrangle. Thickness 0-915+ m (0-3,000+ ft)




- Twdr WIND RIVER FORMATION (LOWER EOCENE)**
 Wind River Basin--Upper part is arkosic conglomerate and sandstone grading northward into siltstone and claystone; lower part is generally fine-grained gray sandstone and variegated to drab claystone. Thickness 0-460 m (0-1,500 ft).
 Northern part of Hanna Basin--Arkosic conglomerate and sandstone grading southward into variegated claystone. Thickness 0-150 m (0-500 ft)
- Tim INDIAN MEADOWS FORMATION (LOWER EOCENE)--Arkosic**
 conglomerate, gray sandstone, and variegated to drab claystone; finer grained in Wind River Basin. Thickness 0-45 m (surface) to 915+ m (subsurface, in Wind River Basin) (0-150 ft to 3,000+ ft)
- Tls PRE-MIDDLE EOCENE LANDSLIDE MASSES--Coherent masses and blocks**
 of Mowry and Cloverly Formations that have been let down or moved laterally onto older strata. Present only in Tps. 26-28 N., R. 77 W.
- Tfu FORT UNION FORMATION (PALEOCENE)**
 Northern part--Chalky white to bluish-white to rusty-brown noncalcareous sandstone, thin conglomerates of granite clasts in upper part and siliceous sedimentary rock clasts in lower part; white to gray shale, claystone, and siltstone. Thickness 0-915 m (0-3,000 ft)
 Southwestern part--Same general lithology as in northern part except that many coal beds are present in subsurface sections and many of the shale, siltstone, claystone, and mudstone beds are variegated. Thickness 0-760 m (0-2,500 ft)
- Tft Tullock Member--Drab-colored sequence, chiefly massive**
 sandstones. Thickness 0-400 m (0-1,300 ft)
- Th HANNA FORMATION (PALEOCENE)--Basin-margin facies of brown**
 granitic conglomerate, gray and brown sandstone, gray to black siltstone, claystone, and shale, and many coal beds. Thickness 0-3,950 m (0-13,000 ft)
- TKf FERRIS FORMATION (PALEOCENE AND UPPER CRETACEOUS)**
 Upper part (Paleocene)--Gray, brown, and yellow sandstone and many thick coal beds. Thickness 1,650 m (5,400 ft)
 Lower part (Cretaceous)--Dark-brown conglomerate in which clasts are not locally derived, brown sandstone, and shale. Thickness 355 m (1,100 ft)

- K1 LANCE FORMATION (UPPER CRETACEOUS)**
 Powder River Basin--Somber shale and drab massive lenticular concretionary sandstone; thin coal beds in lower half. Thickness 600-700 m (1,970-2,300 ft)
 Wind River Basin--Sandstone, white to light-gray, massive to crossbedded, and thin beds of carbonaceous shale and gray shale. Thickness 300-760 m (1,000-2,500 ft)
 Great Divide Basin--White to gray sandstone at top, underlain by thick sequence of interbedded siltstone, sandstone, shale, and mudstone; abundant ironstone concretions; coal near base. Thickness 900-1,250 m (2,950-4,100 ft)
- Kmb MEDICINE BOW FORMATION (UPPER CRETACEOUS)--Brown and gray sandstone, siltstone, and shale; beds of coal in lower part. Thickness 1,220-1,900 m (4,000-6,200 ft)**
- Kfh FOX HILLS SANDSTONE OR FORMATION (UPPER CRETACEOUS)**
 Northeast part--White to light-gray sandstone and gray sandy shale containing marine fossils. Thickness 45-60 m (150-200 ft)
 Southwestern part--Gray sandstone interbedded with grayish-olive shale. Thickness 105-205 m (350-680 ft)
- Kle LEWIS SHALE (UPPER CRETACEOUS)**
 Northeastern part--Dark-gray soft marine shale interbedded with lesser amounts of marine sandstone. Thickness 300 m (1,000 ft)
 Southern part--Same lithology but thickness is 0-700 m (0-2,300 ft)
- Klle LANCE AND LEWIS FORMATIONS (UPPER CRETACEOUS)**
- Klml LANCE, MEETEETSE, AND LEWIS FORMATIONS (UPPER CRETACEOUS)**
 Meeteetse Formation--Light-gray friable sandstone interbedded with dark-gray carbonaceous shale and yellowish-colored bentonitic claystone. Thickness 120-180 m (400-600 ft)
- Kml MEETEETSE AND LEWIS FORMATIONS (UPPER CRETACEOUS)**
- Kmv MESAVERDE FORMATION OR GROUP (UPPER CRETACEOUS)**
 Northern part--Mesaverde Formation: white Teapot Sandstone Member at top, underlain by gray sandstone, shale, and coal member; nonmarine gray Parkman Sandstone Member at base. Thickness 180-365 m (600-1,200 ft)
 Southern part--Interbedded sandstone, gray shale, and coal beds. In Tps. 24-25 N., Rs. 87-86 W., includes Almond Formation, Pine Ridge Sandstone, Allen Ridge Formation, and Haystack Mountains Formation. Thickness about 1,220 m (4,000 ft)
 Southwestern part--Same lithology but thickness 0-790 m (0-2,600 ft)
- Kc CODY SHALE (UPPER CRETACEOUS)--Gray to black soft limy marine shale and thin bentonite beds; lenticular sandstones especially common in upper part. Thickness in northern part of quadrangle 915-1,370 m (3,000-4,500 ft); in southwestern part, 1,650-1,740 m (5,400-5,700 ft)**

- Ks** STEELE SHALE (UPPER CRETACEOUS)--Dark-gray soft marine shale containing thin beds of gray limestone, white bentonite, and very fine grained hard sandstone. Thickness about 730 m (2,400 ft)
- Kn** NIOBRARA FORMATION (UPPER CRETACEOUS)--Dark-gray to yellowish-buff marine shale and chalky soft limestone; highly seleniferous. Thickness about 215 m (700 ft)
- Ksn** STEELE AND NIOBRARA FORMATIONS (UPPER CRETACEOUS)
- Kf** FRONTIER FORMATION (UPPER CRETACEOUS)--Gray fine- to coarse-grained quartz sandstone interbedded with gray to black siltstone and shale; glauconitic in part. White to yellow bentonite, white to gray porcellanite, and thin impure coal beds are present in lower part. Sequence is more shaly to east and northeast. Thickness 180 m (600 ft) in the east, thickening to about 305 m (1,000 ft) in the west
- Kcf** CODY SHALE AND FRONTIER FORMATION (UPPER CRETACEOUS)
- Kmt** MOWRY AND THERMOPOLIS SHALES (LOWER CRETACEOUS)--Thickness of both formations 90-150 m (300-500 ft)
- Mowry Shale--Black to gray hard siliceous shale that weathers silvery gray and contains abundant fish scales. Numerous bentonite beds
- Thermopolis Shale--Muddy Sandstone Member, at top, consists of 15-30 m (50-100 ft) of gray lenticular carbonaceous sandstone and is underlain by the lower black shale member, which consists of 30-60 m (100-200 ft) of black fissile soft shale
- KJ** CLOVERLY AND MORRISON FORMATIONS
- Cloverly Formation (Lower Cretaceous)--"Rusty beds" sequence of brown-weathering fine-grained gray slabby sandstone at top, underlain by lenticular variegated plastic claystone; at base is hard brown chert pebble conglomerate and sparkly sandstone. Thickness 30-90 m (100-300 ft)
- Morrison Formation (Upper Jurassic)--Dully variegated silty siliceous claystone and siltstone interbedded with gray to white silty sandstone. In some places there are lenticular dune-type sandstones as thick as 30 m (100 ft). Thickness 30-90 m (100-300 ft)
- Js** SUNDANCE FORMATION (UPPER AND MIDDLE JURASSIC)--Upper part is greenish-gray glauconitic shale and gray limy sandstone; middle part is red and gray nonglauconitic sandstone and shale and thin gypsum and limestone beds; lower part is thick-bedded gray to pink sandstone. Thickness 45 m (150 ft) in southwestern part and 170 m (550 ft) in northeastern part
- KJs** CLOVERLY, MORRISON, AND SUNDANCE FORMATIONS

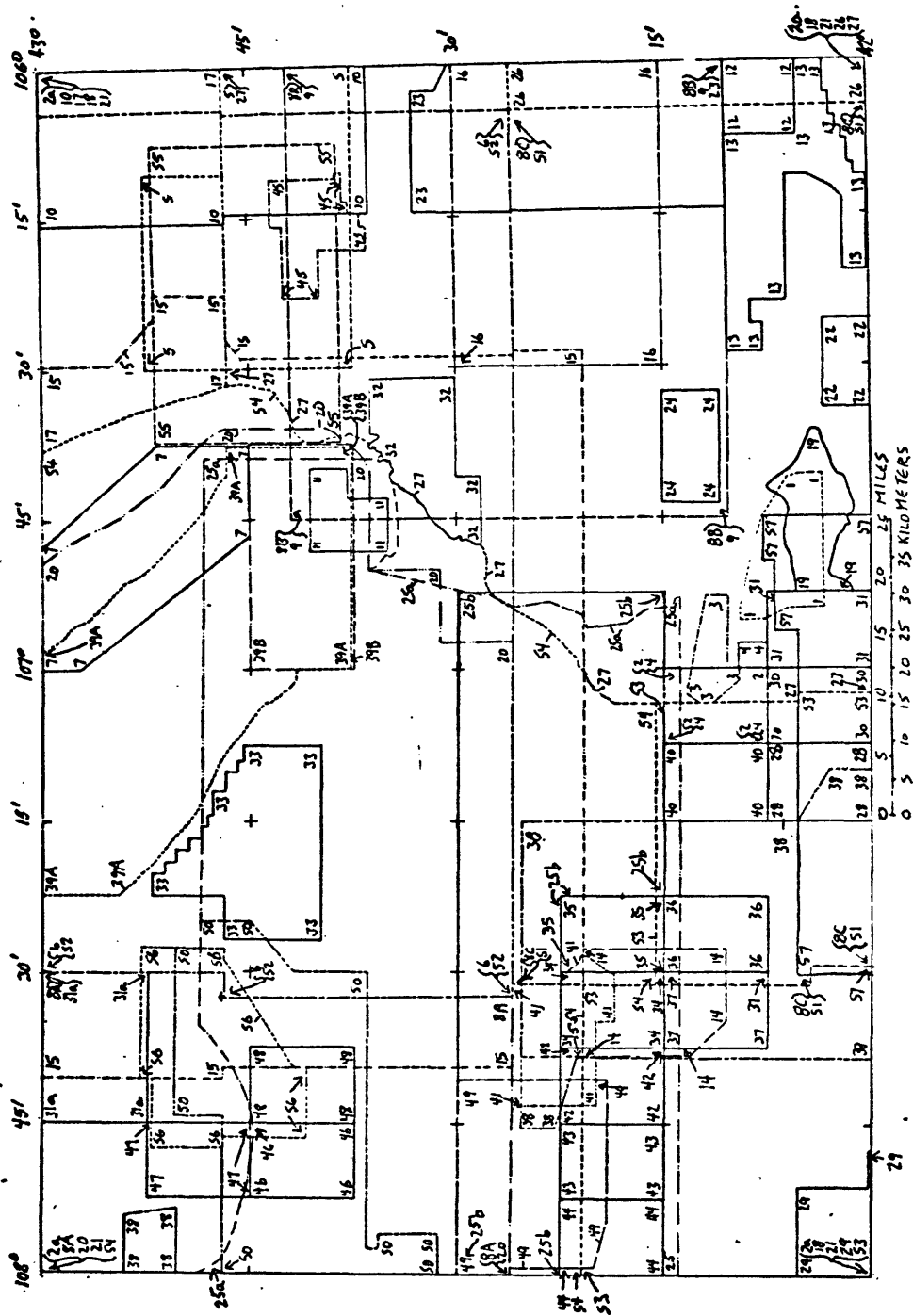
- JR u** **SUNDANCE FORMATION AND NUGGET SANDSTONE**
 Sundance Formation (Upper and Middle Jurassic)
 Nugget Sandstone (Jurassic? and Triassic?)--Massive crossbedded and thin-bedded salmon-pink sandstone with large frosted rounded grains; lower part is silty and shaly and intertongues southeastward with Triassic rocks. Present only in northwest part of quadrangle. Thickness 0-60 m (0-200 ft)
- JR P** **NUGGET SANDSTONE, CHUGWATER GROUP OR FORMATION, AND GOOSE EGG FORMATION--Classification used in Tps. 26-28 N., Rs. 87-89 W.**
 Nugget Sandstone (Jurassic? and Triassic?)
 Chugwater Group or Formation (Triassic)
 Goose Egg Formation (Lower Triassic and Permian)--Red to ocher shale and siltstone, thin limestone, dolomite, and gypsum beds. Thickness 60-90 m (200-300 ft)
- Rc** **CHUGWATER GROUP OR FORMATION (TRIASSIC)--Where mappable, Group includes Popo Agie and Jelm Formations, Alcova Limestone, and, at base, Red Peak Formation. Where not mappable, these are considered to be members. Thickness 90-305 m (300-1,000 ft)**
- Rcd** **CHUGWATER GROUP OR FORMATION AND DINWOODY FORMATION**
 Chugwater Group or Formation (Triassic)
 Dinwoody Formation (Lower Triassic)--Tan to olive-drab hard slabby fine-grained dolomitic siltstone and sandstone. Present only in western half of quadrangle; grades eastward into upper part of Goose Egg Formation. Thickness 15-24 m (50-80 ft)
- R Pg** **GOOSE EGG FORMATION (LOWER TRIASSIC AND PERMIAN)--Red to ocher shale and siltstone, thin limestone, dolomite, and gypsum beds. Thickness 60-90 m (200-300 ft)**
- R Pcg** **CHUGWATER GROUP OR FORMATION AND GOOSE EGG FORMATION (TRIASSIC AND PERMIAN)**
- RPc** **CASPER FORMATION (LOWER PERMIAN AND UPPER AND MIDDLE PENNSYLVANIAN)--Red and white sandstone, gray hard persistent limestone, and red shale and siltstone. Thickness 180-335 m (600-1,100 ft)**
- IPM** **TENSLEEP SANDSTONE AND AMSDEN FORMATION**
 Tensleep Sandstone (Pennsylvanian)--Gray to buff crossbedded sandstone; several gray cherty limestones and dolomites in lower part. Thickness 67-100 m (220-330 ft)
 Amsden Formation (Pennsylvanian and Upper Mississippian)--Gray dolomite, red and green shale, and thin gray sandstone. Persistent tan sandstone at base. Thickness 38-100 m (125-300 ft)
- Mm** **MADISON LIMESTONE (UPPER AND LOWER MISSISSIPPIAN)--Blue-gray massive to thin-bedded cherty limestone, cavernous in part. Thickness 30-120 m (100-400 ft)**
- MG** **MADISON LIMESTONE AND CAMBRIAN ROCKS**

- 6r** CAMBRIAN ROCKS--Includes Gallatin Formation (Upper Cambrian), Gros Ventre Formation (Upper and Middle Cambrian), and Flathead Sandstone (Middle Cambrian). Thickness 0-150 m (0-500 ft)
- MzPz** MESOZOIC AND (OR) PALEOZOIC ROCKS--Present in T. 27 N., R. 81 W.
- Pzr** PALEOZOIC ROCKS--Includes Casper, Tensleep, Amsden, and Madison Formations and Cambrian rocks; in Tps. 29-31 N., Rs. 77-79 W.
- p6** PRECAMBRIAN ROCKS--Granite and metamorphic rocks of many types. K-Ar and Rb-Sr ages of these rocks range from 2,400 m.y. on Casper Mountain to 1,460 m.y. in the Granite Mountains (Peterman and Hildreth, 1978, fig. 8)

- CONTACT--Dashed where approximately located
- FAULTS--Dotted where concealed
-  Normal fault--Bar and ball on downthrown side
-  Thrust fault--Sawteeth on upper plate
-  Major basin-margin Laramide thrust and reverse faults buried by younger rocks--Sawteeth on overriding block. In some places the trace coincides with late Cenozoic normal faults with the basin block upthrown

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INDEX SHOWING SOURCES OF GEOLOGIC DATA

SOURCES OF GEOLOGIC DATA

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